

### **EXAMINER'S AMENDMENT**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Craig Lundell on 04/20/2011. The application is amended as follows:

Claim 1. A process for the generation of electricity and the production of a concentrated carbon dioxide stream using a molten carbonate fuel cell, the fuel cell comprising an electrolyte sandwiched between an anode and a cathode, an anode chamber and a cathode chamber, wherein the process comprises:

feeding a fuel gas to the anode chamber and a cathode inlet gas comprising carbon dioxide and a molecular oxygen to the cathode chamber;

producing electricity, an anode off-gas and a cathode off-gas via anode and cathode reactions;

feeding at least part of the anode off-gas to a catalytic afterburner wherein it is oxidized with an oxidant to obtain an oxidized anode off-gas;

recycling the remainder of the anode off-gas to the anode chamber; wherein the oxidant consists of part of the cathode off-gas and/or part of a molecular oxygen containing external oxidant stream, which external oxidant stream comprises at most 20% (v/v) nitrogen;

the oxidized anode off-gas is brought into heat-exchange contact with the remainder of the cathode off-gas and the remainder of the external oxidant stream to obtain a cooled anode off-gas and a heated mixture of cathode off-gas and external oxidant;

the cathode off-gas is cooled before it is brought in heat-exchange contact with the oxidized anode off-gas;

the cooled anode off-gas and the heated mixture of cathode off-gas and external oxidant are fed to the cathode chamber as cathode inlet gas;

as soon as a set point in the carbon dioxide concentration at the cathode chamber outlet of in the range of from 5 to 40% (v/v) is reached, part of the cooled anode off-gas is withdrawn from the process-, where it is processed to obtain a concentrated carbon dioxide stream.

Claim 2. The process of claim 1, wherein the withdrawn anode off-gas is further cooled to separate water from it and to obtain a the concentrated carbon dioxide stream.

### **REASONS FOR ALLOWANCE**

The following is an examiner's statement of reasons for allowance: The present invention is drawn to a process for the generation of electricity and the production of a concentrated carbon dioxide stream using a molten carbonate fuel cell, the fuel cell comprising an electrolyte sandwiched between an anode and a cathode, an anode

chamber and a cathode chamber, wherein the process comprises: feeding a fuel gas to the anode chamber and a cathode inlet gas comprising carbon dioxide and a molecular oxygen to the cathode chamber; producing electricity, an anode off-gas and a cathode off-gas via anode and cathode reactions; feeding at least part of the anode off-gas to a catalytic afterburner wherein it is oxidized with an oxidant to obtain an oxidized anode off-gas; recycling the remainder of the anode off-gas to the anode chamber; wherein the oxidant consists of part of the cathode off-gas and/or part of a molecular oxygen containing external oxidant stream, which external oxidant stream comprises at most 20% (v/v) nitrogen; the oxidized anode off-gas is brought into heat-exchange contact with the remainder of the cathode off-gas and the remainder of the external oxidant stream to obtain a cooled anode off-gas and a heated mixture of cathode off gas and external oxidant; the cathode off-gas is cooled before it is brought in heat-exchange contact with the oxidized anode off-gas; the cooled anode off-gas and the heated mixture of cathode off-gas and external oxidant are fed to the cathode chamber as cathode inlet gas; as soon as a set point in the carbon dioxide concentration at the cathode chamber outlet of in the range of from 5 to 40% (v/v) is reached, part of the cooled anode off-gas is withdrawn from the process, where it is processed to obtain a concentrated carbon dioxide stream.

The closest prior art Farooque discloses a process for the generation of electricity and the production of concentrated carbon dioxide by using a molten carbonate fuel cell, the fuel cell comprising an electrolyte, an anode and a cathode, an anode chamber and a cathode chamber, wherein the process comprises: feeding a fuel

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gas to the anode chamber and a cathode inlet gas comprising carbon dioxide and molecular oxygen to the cathode chamber; producing electricity, an anode off-gas and a cathode off-gas via anode and cathode reactions; wherein part of the anode off-gas is fed to a catalytic afterburner wherein it is oxidized with an oxidant; and the remainder of the anode off-gas is recycled to the anode chamber; wherein the cathode off-gas goes through a heat exchanger and is mixed with external oxidant and the mixture and anode off-gas are fed to cathode through a cooling (heat exchange) assembly. Farooque does not expressly disclose that the oxidant stream comprises at most 20% (v/v) nitrogen. In addition, Farooque does not expressly disclose a set point for CO<sub>2</sub> concentration in the range of 5-40% in the cathode chamber outlet. Furthermore, Farooque fails to disclose that part of the cooled anode off-gas is withdrawn from the process, where it is processed to obtain a concentrated carbon dioxide stream.

Hildebrandt teaches a high temperature fuel cell for production of electricity and CO<sub>2</sub> wherein the oxidant comprises 99.5% oxygen and only 0.1% nitrogen.

Nakazawa teaches recycling CO<sub>2</sub> with anode off-gas to the cathode chamber in a molten fuel carbonate fuel. Wherein the concentration of CO<sub>2</sub> in the cathode inlet is high and the utilization factor is low, rendering the concentration of the CO<sub>2</sub> in the cathode outlet within the range disclosed by applicant.

However, neither Hildebrandt nor Nakazawa teach that part of the cooled anode off-gas is withdrawn from the process, where it is processed to obtain a concentrated carbon dioxide stream. Therefore, taken together, the references do not teach or make obvious the claimed invention.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LADAN MOHADDES whose telephone number is (571)270-7742. The examiner can normally be reached on Monday to Thursday from 8:30 AM to 6:00 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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